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A PROPOSED METHOD AND CHALLENGES INWIRELESS BODY AREA NETWORKS FOR HEALTHCARE SYSTEMS

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ABSTRACT

Caring health is one of vital issue to solve through wireless communication technology; it should be efficient interms of cost and reliable communication with suitable protocols. Example of such network is called wireless body area network, consist of tiny & small sensing nodes connected with human body to measure physiological values of the body. Application of such networks include in e-health, patient monitoring & soldiers health monitoring.This network is used to share healthcare information, applications, infrastructure in a fully automated manner.The major deployment challenging issue about WBANs is its heterogeneous nodes,which needs coordination between them. In literature different type of solutions provided,but these schemesare facing the problems of fair packet transmission, energy consumption and delay.This paper reviews the current work in it and deploying challenges.

Keywords*: *Wireless Body Area Network, Protocols and Heterogeneous nodes.

I. INTRODUCTION

Human being spends the extremeamount of economy to his health and governing body of any country also spends more economy towards the health care. But in heath care spending amount divided into two categories, such as diagnostic system and treatment, hospital stays [1]. Unfortunately most of the spending money is towards the treatments & hospital stays.Thus we needs a proactive & distributed system instead of central reactive health care system. Solution to it is Wireless body area networks (WBANs) and it consist of

- Sensor measuring
  temperature, heartbeat, ECG, etc.
- Actuator delivering
  medication, electric signals, etc.
- PDA pre-processing and transmitting data

WBANsis composed of heterogeneous sensing nodes can capable of sense, process & communicate one/multiple vital signs such as heart beats, blood pressure, pulse, oxygen saturating activities. WBANs nodes can use for environmental signs such as location of object, temperature, light & humidity. These nodes placed in

human body by tiny patches or hidden in human's clothes, allow free to move.Wearable systems for health care come in differentforms. Wearable systems in WBANs are known as sensing nodes, characterised as fallows Small intelligent devices

- Attached or implanted in the body
- Capable of wireless communication
- Limited energy resources, Low transmission power

Current generation network & smart mobile technology increase towards the use of mobile phone for healthcare, literature work witnessed that e-health is expanding with novel technology such as mobile, internet, satellite, cloud computing.

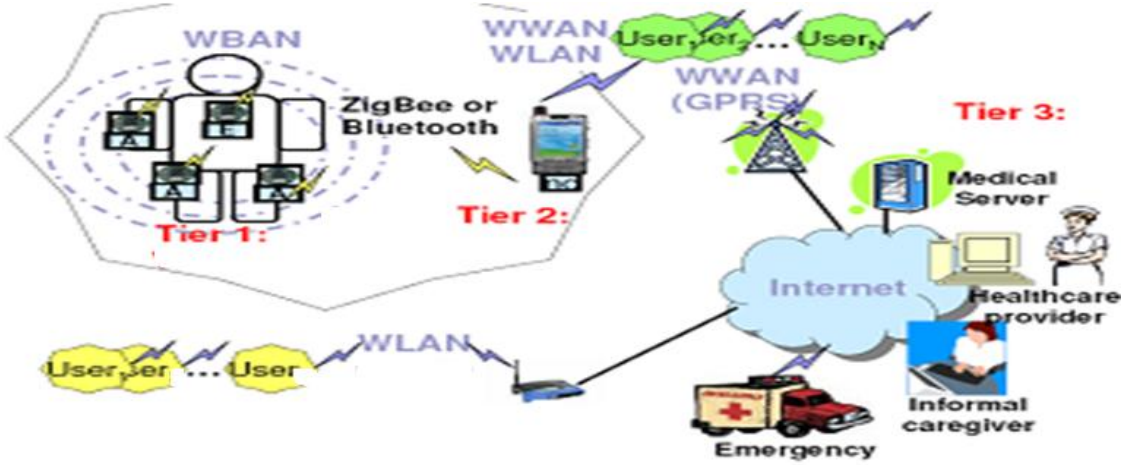
II. WEARABLE SYSTEMS

Wearable devises [1] for health care comes in different forms and provide various types of applications from personal fitness to diagnostic problems of human beings.Currently lot of research work going on to develop effective healthcare care systems.Fanklin was introduced event based monitoring systems for diagnosis heart monitoring, but it is unable to use in-office diagnosis system. In which patient wear the system for long period of time, if he experiences any kind of symptomatic episode, then he needs to activate even by pressing button. System is sense up to 32 minutes, and sensed data is used for diagnosis.

MCOT is a mobile cardiac outpatient telemetry system consists of three lead ECG sensors, electrode, portable health care monitoring device & centre system for gathering data from different users. Sensors are placed on patient's chest and electrode is placed at belt, monitoring device placed nearby patient such as on table.The user data is received by monitoring system and it continuously processes& capable of detects abnormality if happen.

The Code Blue project facilitates a real time triage in disaster relief situations by equipping patients with sensors to form Mobile sensor networks. It is used to detect those patients who need medical attention.This system monitors the health by wireless pulse oxi-meter,wirelessECG, triaxial accelerometer based motion sensors with the help of Personal Digital Assistantfor health monitoring. Media Lab provides the system which can monitor the human physiological state & surrounding atmosphere by wearable sensors.

III. ARCHITECTURE OF WBANs



WBANs [2] is an emerging technology of wireless sensor networks, in which number of sensor nodes equipped with human body for monitoring the health care.In order to provide robust communication network needs effective protocols such as collecting data from patients, managing data & analysing abnormality. The major advantage of WBANs is to provide the freedom to move freely to elderly people. WBANs is a heterogeneous network, as nodes are equipped with difference patient and for different parameters. Thus each node contains different energy, computation capacity and to perform different functionalities, which leads to increase the complexity of network. General architecture of WBANs contains three tiers [8].

Tier1 consist ofConsist of intelligent sensor nodes, which can used to sense, sample, process & communicate. Major part of Sensor nodes consist of sensing unit, Converter, microcontroller and transmitter.

Tier2 is personal Server: - It is interface with Sensor nodes by the use of communication technology such as Bluetooth/ ZigBee. Personal Server connected to outside server by telephonic networks such as GSM, GPRS or WLANs—Internet. The main functionality of Personal server is to register the sensor nodes and collect the information and process it and share the information to medical server.

Tier 3 is Medical Server: -It main functionality is authenticating the patients, and save the collected patient data to memory. And major functionality is to analyze the data to detect the serious health cases so as to contacts with intensive care givers.

IV. CHALLENGES

Most important considerable issue for developing WBANs is interference, latency and energy due to its characteristics such as heterogeneity, complex structure, mobility and high node density. Interference occurs due to large number of sensing nodes present in a hospital in a same radio communication range. Interference challenges and its mitigation techniques provide in work [3]. Packet losses occur in network due to high dense traffic and are reduced by either combining packets or by clustering proposed in [4]. Clustering leads to overhead of control packets and is unacceptable for WBANs. Thus work [5] proposed an effective cluster algorithm to reduce overhead [5]. Achieving reliable communication in heterogeneous network is challenging, work [6] proposed a clustering based method to provide heterogeneous network more reliable with resource constrained rouging. Communication link break occurs in any wireless network topology, which impact on network throughput and reliability of system. Work [7] provides complete architecture to solve the issue of link break in network by multi hop network with fixed access points.

Thus important considerable thing for developing wearable system is, sensors are battery powered and heterogeneous.

Energy

- Sensing
- Communication
- Data processing

Heterogeneous Devices

- Sensor nodes
- Actuator nodes

- Personal devices

More over WBNs requires anefficient implementation cost, operate in a global, license-exempt band and Concurrent availability of asynchronous and isochronous channels. By introducing effective sleep modes and remote wake-up can manage the energy.Frequency using for communication should not harm the human body and it should be free from interference.

V. CONCLUSION

Wireless body area network is an emerging technology of wireless sensor networks, and serve for patient and doctors. Developing aim is to provide freedom to elder peoples by monitoring their health activities. Deployment of this network is suffering from interference, energy consumption and packet loss issues and it relay on reliable communication and robustness of network sensor nodes. More over on time patient's data delivery is essential for mobile treatment to ill people.

REFERENCES

[1]. Otto, C., 2006. An Implementation of a Wireless Body area Network for Ambulatory Health Monitoring (Doctoral dissertation, The University of Alabama in Huntsville).

[2]. Salam, H.A. and Khan, B.M., 2016. Use of wireless system in healthcare for developing countries. Digital Communications and Networks, 2(1), pp.35-46.

[3]. T.T. Thien Le, S. Moh, Interference mitigation schemes for wireless body area sensor networks: a comparative survey, Sensors 15 (6) (2015) 13805–13838. http://dx.doi.org/ 10.3390/s150613805.

[4]. Z. Zhang, H. Wang., C. Wang, H. Fang, Cluster-based epidemic control through smart-phone-based body area network, IEEE Trans. Parallel Disturb. Syst. 26 (3) (2014) 681–690. http://dx. doi.org/10.1109/TPDS.2014.2313331.

[5]. P.T. Hiep, R. Kohno, Control super frame for High Throughput of Cluster-based WBAN with CSMA/CA, in: Proceedings of 25thIEEE International Symposium on Personal, Indoor and Mobile Radio Communications, 2014, 1125–1130. http://dx.doi.org/ 10.1109/PIMRC.2014.7136336

[6]. S. Tanwar, N. Kumar, J. Rodrigues, A systematic review on heterogeneous routing protocols for wireless sensor network, J. Netw. Comput. Appl., Elsevier 53 (2015) 39–56. http://dx. doi.org/10.1016/j.jnca.2015.03.004

[7]. B. Alghamdi, H. Fouchal, A mobile wireless body area network platform, J. Comput. Sci. 5 (4) (2014) 664 –674. http://dx.doi. org/10.1016/j.jocs.2014.02.008

[8]. Otto, C., Milenkovic, A., Sanders, C. and Jovanov, E., 2006. System architecture of a wireless body area sensor network for ubiquitous health monitoring. Journal of mobile multimedia, 1(4), pp.307-326.